

Evaluation of Dragon Fruit and Turkey Berry Extract as a Cleansing Essence against Dental Plaque

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ABSTRACT

Medicinal plants have been played a vital role in treating numerous diseases for thousands of years in many regions of the world. They still serve the principal source of medication in rural areas. Approximately 80% of individuals in underdeveloped nations receive their medical care from traditional practitioners. Dental plaque contains commercial bacteria, which cause the disease. Dental disorders and tooth decay are most serious oral health issues, however oral tissues lesions and pharyngeal and oral malignancies are also serious health issues for mankind. Natural phytochemicals that have been separated from the plants and utilized as traditional remedies. The present review will go deeper into the topic of plant extracts or phytochemicals, which have the ability to suppress the growth of oral infections, lessen the formation of dental plaque, affect bacterial adhesion to surfaces, and alleviate the symptoms of oral diseases. Investigating the effects of aqueous, alcoholic and etheric extract as well as the essence of two medicinal herbs is the goal of our study. The purpose of this study was to examine the use of *SOLANUM TORVUM* and *HYLOCEREUS POLYRHIZUS* peels in extract formulations as a substitute dental plaque agent. Bioactive substances have been found in the peel of *HYLOCEREUS POLYRHIZUS*. The purpose of this presentation is to discuss the current use of medicinal plant extracts linked to medication dosages for the control of microbial bio-gel, with a focus on those found in the oral cavity and their treatment of dental plaque. The potential of polyphenols found in *SOLANUM TORVUM* and *HYLOCEREUS POLYRHIZUS* peel to prevent or treat oral illnesses is summarized in this article based on study results. We will also discuss clinical trials that have looked into the efficiency and safety of these plant-derived medications.

Keywords: *SOLANUM TORVUM*, *HYLOCEREUS POLYRHIZUS*, Dental plaque, Cleansing Essence, Bio-gel, Bioactive substance, plant-derived medications.

I. INTRODUCTION

The soft, sticky covering that surround the teeth is called dental plaque. Bacteria in your mouth combine with starchy or sugary foods to build tooth plaque. According to the 2016 Global Burden of disease Study, 50% of cases worldwide are periodontal. Periodontics is an inflammatory condition that damages the alveolar bone and periodontal ligament; microorganisms that produce plaque. A biofilm example plaque because biofilm cells have altered metabolisms, slower rates of growth and greater stress tolerance. There are around 700 different types of microorganism in mouth, some are harmless, while some can lead to plaque, periodontitis, and dental caries. Various types more than 750 bacteria that live in mouth cavity are linked to oral illnesses. A biofilm is a plaque in present investigation indicate that the characteristics of a surface-associated bacteria in a biofilm can differ significantly from those same cells growing in liquid broth (planktonic cells) Dental plaque and related conditions like gingivitis, periodontitis, and inflammatory reactions are linked to the existence of biofilm in oral cavity. The basic idea behind treating periodontal and plaque illness is gradually stop the disease and reduce inflammation. Dental disease affects 90% of school-age children and most adults, despite those living in the condition of industrialized countries, including nations have low levels of oral healthcare spending mostly limited to immediate dental care or pain management. The usage of chlorohexidine a common chemical in rinse that is currently available on the market, has the benefit of eliminating unwanted microorganisms from the mouth, but it also eliminates helpful bacteria. Natural phytochemicals that have been extracted from plants and utilized in conventional therapies are therefore thought to be good substitutes for synthetic chemicals. As a result, efforts to treat oral disorders with plant extracts that have antibiofilm activity are becoming more widely accepted in the hunt for novel, potent natural products. Our goal is to examine the effects of two traditional plants' essences as well as their aqueous, alcoholic, and etheric extracts. In this study, an alternative dental plaque agent was created using the peels of Turkey berries (*SOLANUM TORVUM*) and red dragon fruit (*HYLOCEREUS POLYRHIZUS*). Antibiotics, antidiabetics, anti-inflammatory, and antioxidant properties are among the pharmacological effects of red dragon fruit. By attaching to food particles and plaque that can lead to diseases, the substance found in dragon fruit peels helps maintain dental health and clean teeth. The bioactive components of *HYLOCEREUS POLYRHIZUS* peel, including as terpenoids and flavonoids, have the ability to suppress bacterial cell wall function. *SOLANUM TORVUM* have been shown to possess potent antioxidant and anti-inflammatory qualities. They are several rich compounds, including gallic acid and ferulic acid. The use of *SOLANUM TORVUM*, which have a moisture content of 84.43g, can lower the risk of plaque formation caused by dry mouth. Bacteria cannot build biofilms or produce organic acids due to the high molecular weight of the polyphenols found in both plant species. The two peels' respective sources of vitamin C function as potent antioxidants that support the health of gum tissues. Gum disease at its early stage can be avoided in this way. Furthermore, this study aimed to demonstrate the scientific evidence that dragon fruit peel and turkey berry have the potential to treat oral diseases, improve human health, and protect the environment by minimizing the use of chemical components in research.

II. SCIENTIFIC CLASSICATION:

DRAGON FRUIT (*HYLOCEREUS POLYRHIZUS*)



Figure1. *HYLOCEREUS POLYRHIZUS*

Kingdom : PLANTAE
Order : CARYOPHYLLALES
Family : CACTACEAE
Subfamily : CACTOIDEAE
Genus : HYLOCEREUS
Species : H. POLYRHIZUA
TURKEY BERRY (*SOLANUM TORVUM*)



Figure2. *SOLANUM TORVUM*

Kingdom : PLANTAE
Order : SOLANALES
Family : SOLANACEAE
Genus : SOLANUM
Species : S. TORVUM

III. MATERIALS AND METHODS:

3.1 SAMPLE COLLECTION

Red dragon fruit peel (*HYLOCEREUS POLYRHIZUS*) and Turkey berries (*SOLANUM TORVUM*) was collected. Both the samples were processed for further experiment used for extraction.

3.2 PLANT EXTRACT PREPARATION

1. Wash the plants thoroughly with tap water to remove soil and dust particles. All plants are air dried under shade at room temperature for 1 to 2 weeks. Grind the dried plants until they appear in powder form.
2. Methanol and distilled water are different solvents used to prepare the extract. Each powder samples (5g) were added to 20 ml of each solvent and stirred at 32 degrees Celsius for 24 hours.

3.3 PHYTOCHEMICAL ANALYSIS

Phytochemical test for detecting various phytochemical components. The phytochemical test like Alkaloids, Phenols, Terpenoids, Tannins oil, Flavonoids, Acids.

3.3.1 DETECTIONS OF ALKALOIDS:

1. Mayer test

A fraction of extract was treated with Mayer reagent (1.5g of mercuric chloride and 5g of potassium iodide in 100ml of distilled water) and observed for the formation of cream.

2. Wagner test

The fraction of extract was treated with Wagner reagent (1.2g of iodine 2g of potassium iodide in 100 ml distilled water) and observed formation of reddish-brown colour precipitate.

3.3.2 DETCTIONS OF PHENOLS

To a fraction of extract 5% FeCl_3 solution were added and observed for the formation of deep blue colour.

3.3.3 DETCTIONS OF TERPENOIDS

Chloroform (2.0ml) and concentrated H_2SO_4 were added carefully to 0.5 ml of extract formation of red brown colour at the interface indicated the presence of terpenoids.

3.3.4 DETECTION OF TANNINS

The extract (5g) was dissolved in 5.0ml of distilled water and few drops neutral 4% of ferric chloride solution were added the formation of blue green indicates the presence of tannins.

3.3.5 DETECTION OF FLAVONOIDS

The fraction of the extract was treated with concentrated H_2SO_4 and observed for the formation of orange colour.

3.3.6 DETECTION OF ACIDS

2drops of ninhydrin solution was added to 2ml of the filtrate. A Characteristic purple colour indicated the presence of amino acids.

TABLE 1. PHYTOCHEMICAL ANALYSIS

S.N O	PHYTOCHEMICAL SCREENING	AQUEOUS EXTRACT OF SAMPLES		METHANOL EXTRACT OF SAMPLES	
		<i>HYLOCEREUS POLYRHIZUS</i> PEEL	<i>SOLANUM TORVUM</i>	<i>HYLOCEREUS POLYRHIZUS</i> PEEL	<i>SOLANUM TORVUM</i>
1.	ALKALOIDS				
	A. MAYER'S TEST	-	+	-	+
	B. WAGNER'S TEST	+	-	+	+
2.	PHENOLS	-	+	+	-
3.	TERPENOIDS	+	-	-	-
4.	TANNINS	-	-	-	-
5.	AMINO ACID AND NINHYDRIN	+	-	-	-

**Figure3. Phytochemical analysis****3.4 ORAL MUSH (PUREE) METHOD**

The peel of Red Dragon fruit (*HYLOCEREUS POLYRHIZUS*) and Turkey berry (*SOLANUM TORVUM*) were used. The fibre present can help to clean dental plaque and gym disease. The vitamin c present in *HYLOCEREUS POLYRHIZUS* is a strong antioxidant which helps to

strengthen the gums. It has high water content which is more important for dental health. In *SOLANUM TORVUM* the polyphenols, are more efficient for dental health.

Fresh fruits:

The fresh and healthy *HYLOCEREUS POLYRHIZUS* fruit and *SOLANUM TORVUM* fruit were collected and washed with sterilized water to remove extrinsic matter and other impurities.

Dry peels:

The cleaned peel of *HYLOCEREUS POLYRHIZUS* fruit were straighten out in a clean platter and air dry for 10 days and further more dried in hot air oven at 60 °c for straight 15 mins. And let it cool down for some time. And grind into fine powder.



Figure 4. Drying process

Powder preparation:

When done drying. They will easily crack and crush into small pieces. The dried berries and the peel of dragon fruit were pulverized by using a blender into a fine powder at 1800 mp for straight 5-7 minutes and kept in sterile container, and stored under room temperature of 25°C for analysis.



Figure5. Griding process

3.5 ORAL PASTE PREPARATION

The combined powder of *HYLOCEREUS POLYRHIZUS* and *SOLANUM TORVUM* were taken in grams (5g). And add rain water little by little (because the purest source of natural water is rainwater it's directly comes from the condensation of water in the presence of sunlight) well

after each ml of addition stir well, until it reaches the desired paste consistency. By rubbing or giving a warm massage with this paste directly on the teeth can reduce the dental plaque formation and polyphenols present in the *SOLANUM TORVUM* may reduce the inflammatory in gum and reduce tartar and tooth decay, cavity.



Figure6. Oral paste

3.6 OIL METHOD

The peel of *HYLOCEREUS POLYRHIZUS* and *SOLANUM TORVUM* were dried in room temperature below 30°C. 40 g of grounded mixtures heated in distilled water in a Soxhlet apparatus. The heating will produce steam which in turns out carries the oil and other volatile agents. These were cooled and condensed to obtain the oil. The light weight oil was separated from the extract by filtering it. And finally, it's was stored in a sterile container.



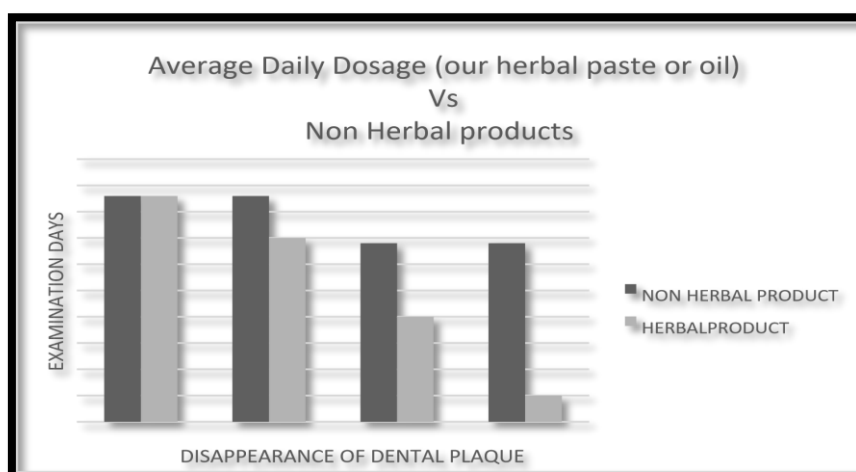
Figure7. Oil preparation

IV. RESULT AND DISSCUSSION

In this work, we present a novel approach to treating oral bacteria that is based on a natural extract that can safely and effectively remove oral germs because commercially available mouthwashes and oral pasts do not contain chemicals. The solution we offer is a way to cure bacterial infections in plaque. In addition to determining if the best antibacterial capacity is now accessible, this study looked into potential future research areas for natural oral cleaner materials. Remarkably, silicon dioxides are not contaminated by numerous harmful chemicals or paste or a mouth rinse, which are frequently utilized in the community.

Antibacterial properties against oral bacteria are demonstrated by extracts from edibles like Turkey berries and Dragon fruits, as well as calcium phosphate, which are naturally occurring substances. It highlights how important donating is. The complicated arrangement of fixed orthodontic appliances makes it difficult for dental floss to remove dental plaque from hard-to-reach areas like the interdental area and the area around the exceed. Furthermore, polyphenols have the potential to decrease the inflammatory reaction in addition to the synthesis and activity of proteolytic enzymes that aid in the disintegration of the extracellular matrix, which is found in dental plaque.

Graph



As a result, patients undergoing orthodontic appliance treatments find it trying to clean their dentures with just a dental floss. When bacteria adhere to the tooth's surface through saliva-derived pellicle intercession, plaque formation starts. Bacteria will eventually assemble one by one to form the first bacterial colonies. The majority of bacteria found on tooth surface colonies are Streptococcus species, with other bacterial species including facultative anaerobic and obligate aerobic bacteria succeeding.

V. CONCLUSION

There is strong evidence that plant extracts, essential oils, and purified phytochemicals have the potential to be turned into compounds that can be utilized as oral disease prevention or treatment therapies, as illustrated by the examples in this paper. Particularly as anti-inflammatory agents, and antibiotics, these products have demonstrated pharmacological effects. Specifically, the characteristics of the high-molecular-weight polyphenols that were separated from these two plants have demonstrated potential in relation to alveolar and dental plaque. Although the number of clinical trials for these products is encouraging, more research on the safety and effectiveness of these agents is necessary to determine whether they can provide therapeutic benefits that can lessen the global burden of oral diseases, either on their own or in conjunction with traditional therapies.

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